Acquisition of English Relative Clauses by Korean-speaking Learners of English

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This study investigated whether Korean-speaking learners of L2 English differentiate between lexically-headed relatives and headless relatives and demonstrate any preference between the two structures. It further examines whether learners acquire headless relativization in the order predicted by Keenan and Comrie's (1977) NPAH hypothesis and its application in language acquisition (Comrie, 2007). To this end, data were collected from forty-seven adult Korean speakers (28 female; 19 male) ages 19-36 (with an average age of 25.8), using an elicited imitation task and a grammaticality judgment task. Results from the learners with different proficiency levels showed fewer errors in headless relatives than they did in lexically-headed relatives, regardless of the gap position (subject vs. direct object) and the nature of the test instruments. The learners further showed a subject advantage in the realm of headless relatives, which supports the validity of Keenan and Comrie's NPAH hypothesis in the acquisition of English headless relativization.

Keywords: English relative clauses, headless relatives, elicited imitation, grammaticality judgment, Korean-speaking learners of English

1. Introduction

A great deal of research has investigated the acquisition of English relative clauses (RCs), with particular attention paid to the disparity between the subject versus object positions as the site of extraction within the RC, drawing upon the typological implications of Keenan and Comrie's (1977) Noun Phrase Accessibility Hierarchy (NPAH) hypothesis. These studies have shown that it is easier to understand and produce English RCs with subject gaps than RCs with object gaps (Doughty, 1991;

Eckman, Bell, & Nelson, 1988; Gass, 1979; Wolfe-Quintero, 1992). The following shows an RC with a subject (SU) gap and an RC with a direct object (DO) gap:

(1) a. Relative clause with a subject gap
I want the toy which [e] plays a song

b. Relative clause with a direct object gap
I want the toy which my aunt bought [e]

In (1a & b) above, the head *the toy* is in its matrix position, while the corresponding position inside the RC is empty, as indicated by [e]. The relative pronoun *which* is extracted from the embedded position into the initial position of the RC, next to the external head (Riemsdijk, 2006). The relation between the head and the relative pronoun is transparent in that the head is the antecedent of the relative pronoun, as indicated by the co-indexation of the head with the relative pronoun. The lexical head needs to satisfy two sets of requirements: those of the RC and those of the matrix clause. The nature of the head determines the choice of the relative pronoun. In (1a & b) above, *which* must be chosen, not *who*, because its antecedent, *the toy*, is non-human. An RC generally modifies a phrasal constituent, i.e. a noun phrase, and the noun phrase is called the head of the RC. An RC without a head is called "headless" or "a free relative," as seen below.

(2) a. Headless relative
I eat what you cook

b. Embedded question
I wonder what you cook (Ott, 2011)

In (2a) above, the matrix verb *eat* subcategorizes a noun phrase, not an embedded question, while in (2b), the matrix verb *wonder* selects a question. That is, the status of the headless relative has to do with the selection

pattern of a matrix verb. Previous research (Bresnan & Grimshaw, 1978; Ott, 2011; Riemsdijk, 2006) has argued that headless relatives behave differently from embedded questions, despite similarities in surface form. However, no research thus far has addressed the second language (L2) acquisition of English headless RCs, nor the potential discrepancies between the L2 acquisition of headed RCs and headless RCs. There is a gap in the body of knowledge with respect to the differential acquisition of headed RCs and headless RCs and the location of headless RCs in the English relativization hierarchy. This research sets out to fill these gaps.

The purpose of this research is twofold. First, this research sets out to examine whether adult Korean learners of L2 English differentiate between lexically headed relatives and headless relatives and demonstrate any preference between the two structures in L2 development. Next, this study aims to examine whether Korean-speaking L2 learners acquire headless relativization in the order predicted by Keenan and Comrie's (1977) NPAH hypothesis and its application in language acquisition (Comrie, 2007). To pursue these goals, this study looks into the performance of adult Korean-speaking learners of L2 English with different proficiency levels on an elicited imitation task and a grammaticality judgment task on these target structures, in comparison to the performance of English native speakers on those tasks.

1.1. Acquisition of Relative Clauses

Keenan and Comrie's (1977) NPAH hypothesis predicts from a typological perspective that if a language relativizes a noun phrase in the hierarchy, then any other noun phrase in a higher position can also be relativized. Subjects are highest in the NPAH, followed by direct objects, indirect objects, obliques, genitives, and objects of comparison. The implication of the NPAH has been related to processing and acquisition constraints (Comrie, 2007). The constraints derived from the NPAH have been extended to gauge the rank order of processing difficulty and acquisition of English RCs in both first (e.g., Diessel & Tomasello, 2005;

Friedmann & Novogrodsky, 2004) and second language acquisition (e.g., Doughy, 1991; Eckman, Bell, & Nelson, 1988; Gass, 1979). There is a general consensus that RCs with object gaps are more difficult to process and acquire than RCs with subject gaps in first and second language acquisition (O'Grady, 2011). In order to account for the subject-object asymmetry, different hypotheses have been proposed over time. This study will take into account two major hypotheses: the filler-gap hypothesis and the prominence hypothesis. Both hypotheses are drawn from the psycholinguistic literature on the processing of RCs with the assumption that a processing advantage is associated with a developmental advantage.

First, the filler-gap hypothesis states that the distance between the filler and gap can constrain the acquisition order of various types of RCs. Specifically, the hypothesis predicts that English subject relatives, as in (3a), are acquired before their direct object counterparts, as in (3b), due to the closer distance between the head noun and the gap created at the site of extraction.

(3) a. Relative clause with a subject gap
The girl [that _ met the boy]
0
closer

b. Relative clause with a direct object gap:
The girl [that the boy met_]
1 2
more distant

Numerous studies using a variety of testing methods both for production and comprehension have shown that subject relatives appear before or no later than direct object relatives in head-first languages, such as English and German (Diessel & Tomasello, 2000, 2005; O'Grady, 2011; on the subject-object asymmetry in the processing and acquisition of head-final languages, such as Korean, see Jeon & Kim, 2007; Kwon, Lee, Gordon, & Polinsky, 2010; Lee-Ellis, 2010; O'Grady, Lee, & Choo, 2007). It is important to note, however, that the structural properties of filler and

gap are not enough to fully explain the issues of processing and acquisition. For in a sentence such as that in (4), the subject is pronominal, thus introducing no new discourse referent, and the direct object is inanimate, reflecting the canonical semantics of the NP associated with that syntactic category. Under such conditions (i.e., either a pronominal subject, an inanimate direct object, or both), it has been shown that the difficulty of acquisition and processing associated with object relatives is alleviated and even eliminated (O'Grady, 2011).

(4) The apple [that she ate _]

The absence of a processing disadvantage for object RCs of this type is presumably associated with no developmental delay in first language acquisition, as reported in Kidd, Brandt, Lieven, and Tomasello (2007). The group of researchers found in corpus data and in the results of an elicited imitation task with 3-to 4-year-old English- and German-speaking children that first-language learners do as well on object RCs containing a pronominal or inanimate argument as they do on subject RCs.

Second, the prominence hypothesis predicts that a referent functioning as a subject within the RC is more prominent than a referent functioning as a direct object (Kuno, 1987; O'Grady, 2011; Zukowski, 2009). In other words, it is easier to construe an interrelationship between a head noun and its referent within an RC when that referent corresponds to a salient component of the RC, such as its subject. The greater the referent's prominence within the RC, the more easily the processor can establish the interrelationship between the head noun and its referent in the RC that is essential to the acquisition of the RC.

It is also of great importance to note that in addition to the two hypotheses derived from the relative difficulty (or ease) of information processing, the kinds of tasks and methodologies used may potentially influence findings about the subject-object asymmetry. In fact, inconsistent results from different studies were observed, depending on the tasks used. Studies using a picture selection comprehension task (e.g., Kanno, 2007; O'Grady, Lee, & Choo, 2003), a sentence combination task (e.g., Ozeki & Shirai, 2007;

Yabuki-Soh, 2007), or an elicited production task (e.g., Jeon & Kim, 2007; Ozeki & Shirai) generally demonstrated evidence in support of the NPAH effect. Studies that used a sentence comprehension task (e.g., Yabuki-Soh) or naturalistic data (Ozeki & Shirai; Yip & Matthews, 2007) showed little evidence for the NPAH effect. Furthermore, L2 learners' general proficiency may come into play. Lee-Ellis (2010) showed that the effect of the filler-gap distance varied as a function of different levels of proficiency for L2 learners of Korean.

The aforementioned studies converge on the general observation that RCs with subject gaps are less difficult for language learners to process and acquire than RCs with object gaps in head-first languages, such as English. The next logical question is whether this asymmetry between subject- and object-headed RCs can be applicable to English headless RCs. The following section will briefly discuss the acquisition of headless RCs.

1.2. Acquisition of Headless Relatives

Little research has been conducted on the acquisition of headless RCs. Flynn and Lust (1980) investigated the first language acquisition of headed and headless RCs for English-speaking children whose ages ranged from 3 years 6 months to 7 years 7 months of age. The study used two tasks for different purposes: an elicited imitation task to test structural representations and an act-out task to test semantic comprehension. It was found in the elicited imitation task that free RCs (e.g., Cookie Monster hits *what* pushes Big Bird) are more frequent and target-like than lexically headed RCs, regardless of the semantic determinacy of the head (e.g., Big Bird pushes *the balloon which* bumps Ernie, and Ernie pushes *the thing which* touches Big Bird). The results of the act-out comprehension task revealed that there was no difference between children's interpretation of the headless RCs and the non-determinate headed relatives, and that both of these structures were easier for children to comprehend than the determinate headed relatives. The results suggest that children are sensitive to different structures of the RCs and show a preference for the headless RCs based on their structure, independently of the semantic determinacy.

The error analysis revealed that headless RCs are easier for children because they allow a simple nomination of a relativized clause.

More recently, a study by Caponigro, Pearl, Brooks, and Barner (2012) explored children's acquisition of the semantic properties of headless RCs, more specifically the maximal quantification of a phrase containing the headless relative pronoun "what" (e.g., *what* is on the plate) in conjunction with plural definite descriptions (e.g., the things on the plate). A truth-value judgment task and an act-out task showed that children know that the two constructions differ from quantificational nominals (e.g., all the things on the plate) as early as 4 years old. Further, based on the corpus data of children's linguistic input, children also acquire the adult interpretation of both constructions at the same time (around 6-7 years old), despite differences in the frequency of these constructions. It is noteworthy that both this study and Flynn and Lust (1980) point to 6-7 years of age as a time when the target-like structural production and semantic interpretation of the headless RCs start to emerge in first language acquisition.

1.3. Relative Clauses in Korean

While Comrie (2002) has suggested that the RCs of East Asian Languages, including Korean, should be classified as attributive clauses, other researchers, such as Jeon and Kim (2007) and Kim (1987), identified two types of RC structures in Korean: head-external and head-internal. The head-external RC in Korean carries a lexical head noun and a modifying clause, which is similar to RCs in English. The similarity stops here, however. The RC in Korean precedes the noun it modifies, and relativization is marked by adnominal verbal suffixes that convey the tense of the embedded clause: *-(u)n* for the past tense, *-nun* for the present tense, and *-(u)l* for the future tense. The following are examples in which the trace in the modifying clause is an oblique (5), subject (6), and direct object (7):

(5) $[_{NP}$ *[Mary-ka* t_i *chima-lul sa-n] kakey*$_i$*]*
Mary-NOM skirt-ACC buy-REL.PAST store

"The store where Mary bought the skirt"

(6) *[$_{NP}$ [t_j chima-lul sa-nun] yeca$_j$]*
skirt-ACC buy-REL.PRES woman
"The woman who is buying a skirt"

(7) *[$_{NP}$ [Mary-ka t_k sa-l] chima$_k$]*
Mary-NOM buy-REL.FUT skirt
"The skirt that Mary will buy"

In (5) above, the modifying clause carries the past tense verbal suffix *-(u)n*, with the trace in the modifying clause serving as an oblique. The modifying clause in (6) carries the present tense, *-nun*, with the trace as a subject, while that in (7) carries the future tense, *–(u)l*, with the trace as a direct object. With respect to the head-internal RC in Korean, there is no gap in the modifying clause because the lexical head remains within the modifying clause. The clause is marked by a verbal suffix and *ke(s)* ('a thing') at its right boundary. The elements that can be relativized by the head-internal RC are more limited than the head-external RC: the subject and the object only can be relativized. Further, the relativized element can only be selected through the subcategorization of the matrix verb (Jo, 2002).

(8) *Mary-nun [$_{NP}$ [chima-(ul) sa-n] kes]-ul toli-e cwu-ess-ta.*
Mary-TOP skirt-ACC buy-REL.PAST thing COMP-ACC return-AUX-PAST-DEC
"Mary returned the skirt that she bought"
Literally, "Mary returned the thing that she bought the skirt"

There is a consensus on the developmental sequence in L1 and L2 Korean: from headless to head-internal to head-external. Korean children begin to produce RCs around their second birthday (Kim, 1987, p. 346). Kim observed in her longitudinal data of the spontaneous speech of three Korean children that the earliest forms of the RC were headless structures

(e.g., *Mary-ka sa-n ke*, 'what Mary bought'). The children later produced a juxtaposition of *ke(s)* ('a thing') and a lexical head noun (e.g., *pay tha-nun ke salam*, 'the person, the one who is riding a boat') prior to their production of head-external RCs. In a study with the natural speech data of 36 children whose ages ranged from 16 to 45 months, Lee (1991) found a similar developmental pattern. The results of the correlation between age and RC type showed that head-internal types emerge earlier than head-external RCs. The mean age for exclusive production of head-internal RCs was 27 months, whereas the mean age for head-external RCs on top of head-internal ones was 36.3 months. The juxtaposition of *ke(s)* and a lexical head was observed around the age of 34 months, which was an intermediate step towards the mastery of head-external RCs.

When it comes to the observation of the NPAH in L1 Korean, the RC type (head-external and -internal) interacts with the contrastive pattern of subject and object gaps. Previous research (Cho, 1999; Y. Kim, 1987) reports that while Korean children produce more direct object relatives than subject relatives in head-internal RC constructions, they tend to produce more subject relatives than direct object relatives in head-external relativization. In L2 Korean, Jeon and Kim (2007) uncovered two key findings in an elicited production study with 40 learners of Korean as a foreign language with different proficiency levels. First, the developmental order predicted by the NPAH was observed in head-external RCs but not in head-internal RCs. Head-external RCs were used more frequently for subjects (91.1%) than direct objects (83.7%), and learners produced subjects (68.5%) more accurately than direct objects (36.9%). Head-internal structures, on the other hand, were used slightly more frequently for direct objects (6.0%) than subjects (4.8%). The subject advantage in head-external relativization was pointed out as evidence for Korean external RCs as actual RCs (as opposed to attributive clauses espoused by Comrie, 2002). The other finding concerned the developmental sequence of headless RCs prior to head-internal and head-external RCs in L2 Korean as well. Their pretest data show that 45% of the learners used headless and head-internal relatives, despite the few tokens of those constructions. Learners with lower proficiency levels tended to use head-

less and head-internal relatives more frequently than those with higher proficiency levels.

1.4. Research Questions

Drawing upon the extensive literature on relative clauses in language typology and language acquisition, as well as headless relatives in theoretical linguistics and first language acquisition, this study aims to address the following research questions:

1. Do adult Korean-speaking learners of L2 English differentiate between lexically headed relatives and headless relatives, and do they show any preference between the two structures?

2. Do adult Korean-speaking learners of L2 English acquire headless relatives in the order predicted by Keenan and Comrie's (1977) NPAH hypothesis and its application in language acquisition (Comrie, 2007)?

2. Method

2.1. Participants

Forty seven Korean-speaking learners of L2 English participated in the study. Nineteen male and twenty-eight female participants were in the age range of 19-36 years, with an average age of twenty-five years old. All participants spoke Korean as their dominant/first language and went through formal schooling in South Korea, learning English as a foreign language for an average of thirteen years. Fourteen native speakers of Standard American English, of the Midwestern dialect in particular, participated as native-speaking controls. Five male and nine female native speakers were in the age range of 18-22 years, with an average age of twenty-one years.

The L2 learners reported having been in the U.S. from 1 month to

11 years, with an average stay of 3 years and 3 months. Some were enrolled in an intensive English-language program, taking English-as-a-second-language courses for academic purposes. Some were in an undergraduate or graduate degree program with various majors, whereas others were post-doctoral researchers or faculty. Consequently, the participants in the current study showed mixed English language proficiency. The L2 learners were divided into three proficiency groups. The proficiency groups were formed on the basis of participants' performance ratings on a speaking task and a writing task. More information about the three groups of L2 learners in terms of age, length of stay in the U.S., and age of arrival in the U.S. is given in Table 1.

Table 1. Participant Characteristics

Proficiency	Group I (N=17)	Group II (N=14)	Group III (N=16)	Total (N=47)
	Advanced	High-intermediate	Low-intermediate	
Age	25.89 years (SD=4.77)	26.57 years (SD=3.65)	26.69 years (SD=5.39)	26.36 years (SD=4.61)
Length of residence in US	5.09 years (SD=3.36)	2.61 years (SD=2.56)	2.42 years (SD=2.01)	3.44 years (SD=2.95)
Age of arrival in the United States	20.82 years (SD=6.14)	24.07 years (SD=3.73)	24.25 years (SD=5.93)	22.96 years (SD=5.58)

2.2. Target Structure

Target structures of the current study were English lexically-headed and headless RCs attached to the object of a matrix verb. The first language acquisition literature (e.g., Diessel & Tomasello, 2000) has reported with naturalistic data that the main-clause object modified by an RC starts to emerge first as children grow older, and that the main-clause subject is only rarely modified by an RC until later in their development. Each sentence used in this study contained a lexically-headed relative or a headless relative, with two animate lexical NPs with a subject or object gap.

As noted earlier, the previous research reports that the processing difficulty and acquisition delay associated with object relatives is mitigated and even eliminated in cases where the subject is pronominal and/or the direct object is inanimate (Kidd et al., 2007; O'Grady, 2011).

2.3. Instruments and Procedures

After signing a consent form, the participants completed a language background questionnaire and experimental tasks in the following order: (1) an elicited imitation task (EI); (2) a timed grammaticality judgment task; and (3) general proficiency measures. The order of the tasks was, in part, motivated by the logistics of running experimental sessions. Each of these tasks was implemented individually in a quiet office or a study room at a university campus. Below are the descriptions of each task and its procedure:

2.3.1. Background Questionnaire

The participants were asked to complete a background questionnaire that contained questions about their language backgrounds, the age at which they started to learn English, the amount of time they had spent in English-speaking countries, the kind of English-language instruction they had received, and any other languages they had learned.

2.3.2. Elicited Imitation Task

The oral imitation task was used to tap into the implicit knowledge of the L2 learners with respect to the target structures under investigation (Erlam, 2006). The participants were asked to say out loud whether they would agree or disagree with the meaning of the statement by saying out loud "yes," "no," or "I don't know." Immediately after making this judgment, they repeated the sentence in correct English. Prior to the test session, each participant received pre-recorded training to become familiar with the procedures of the task. The practice session contained eight statements in total, four grammatical and four ungrammatical.

The elicited imitation task consisted of 30 statements, sixteen of which

contained the target structures under investigation. The rest of the statements addressed various grammatical structures, such as embedded questions, tense/aspect, and number agreement as a way to distract learner attention from the target structures. Each sentence used in the task contained eight to sixteen syllables in six to ten words. The target structures, English headed relatives and headless relatives, were placed at the end of each sentence, functioning as a direct object of the main verb. Examples of the sentences are given in Appendix.

The thirty sentences were read and audio-recorded by a female native speaker of English, and the resulting audio file was randomized to prevent any ordering effects on learner performance. Shorter sentences came first, and longer sentences were presented later during the testing session (Erlam, 2006). The sentences were played once for each participant. The participants' responses were audio-recorded using the computer software *Audacity*. Their responses were analyzed by identifying obligatory contexts for the use of the target structures, and their scores on this test were calculated as the percentage of sentences restated grammatically out of a maximum of 16 sentences. Self-corrected sentences were counted as grammatical (e.g., "Doctors examine what can, what patients can do."). Participants who produced semantically awkward but grammatically correct sentences received full credit (e.g., "Boys target kids who tend to be quiet" for the stimulus, "Bullies target kids who tend to be quiet."), as did those who produced structurally identical but semantically different utterances (e.g., "The engineers wrote the program that improved the productivity" for the stimulus, "The engineer wrote a program that improved our productivity").

2.3.3. Grammaticality Judgment Task

The grammaticality judgment task was composed of 48 sentences that were evenly divided between grammatical and ungrammatical. The sentences were presented on a computer screen in a randomized order using *E-Prime* (version 2). The participants were instructed to judge the grammaticality of each sentence and press a "1" key for grammatical or a "2" key for ungrammatical on a joystick as fast as they could. The time limit

for each sentence was 20 seconds, and every participant was able to answer all of the questions on the task. A percentage accuracy score was calculated for each participant for each of the target structures.

2.3.4. Proficiency Measures

To determine their general proficiency levels in English, the learners' production in L2 speaking (a = .87) and writing (a = .89) was elicited. Both of the speaking and writing tasks contained six authentic items, respectively, pertaining to various situations that undergraduate and graduate students were likely to encounter, regardless of their academic programs. To respect confidentiality, the learners were told that they did not have to reveal any personal details during their completion of the tasks, but instead could make up details as they wished. The learners' responses to the speaking component were audio-recorded and transcribed, and their responses to the writing task were recorded in a paper-based format. A 7-point scale was used for each rating in both speaking and writing, where higher scores indicated higher quality speech.

An English-Korean bilingual researcher rated the speaking tasks for the number of ideas expressed and for the quality of the English, employing the criteria for rating output quality from MacIntyre, Noels, and Clément (1997). The rating criteria for output quality entailed fluency (flowing speech without pauses), sentence complexity (use of complex sentences rather than fragmented phrases), accented speech (the extent to which the learner sounded like an English native speaker), elaboration (amount of detail), grammar, and proximity to American English colloquial expressions. The writing tasks were rated on the basis of the number of ideas expressed and the output quality. The criteria for output quality included grammaticality, sentence complexity, degree of elaboration, and similarity to a native speaker of American English. The aggregate ratings of the aforementioned criteria for output quality in speaking and writing were used for analysis. Fifty percent of the spoken data were rated by an English-native-speaking research assistant after a training session with the researcher, and there was 85% agreement for speaking and 90% for writing between the two raters. When disagreements between the two

raters arose, the average scores were used for analysis.

The group average and standard deviation of the individual sums of scores were calculated to divide the forty-seven participants into three groups. Group 1 (n=17) consisted of those who scored more than half of a standard deviation above the average, Group 2 (n=14) scored within the range of half of a standard deviation below and above the average, and Group 3 (n=16) scored less than half of a standard deviation above the average.

3. Results

To present the distribution of percentage scores that the L2 learners of different proficiency levels obtained on the elicited imitation task and the grammaticality judgment task, the means and standard deviations for the L2 learners and the native-speaking controls are shown in Table 2. Overall, the native speakers demonstrated scores exceeding the scores of the L2 learners across the different proficiency levels, with less variation on the two measures. It was noted that the performance of Group 1, which had the highest proficiency level, on the grammaticality judgment task was similar to that of the native speakers, particularly with respect to the headless relative construction.

Table 2. Descriptive Statistics: Means and Standard Deviations for the Elicited Imitation Task and the Grammaticality Judgment Task

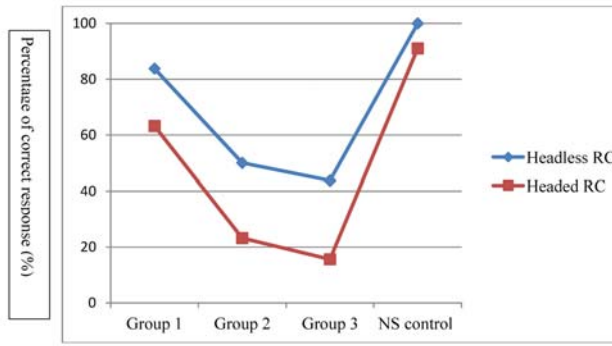
RC type	Proficiency group	L2 learners				Native speakers			
		Elicited imitation		Grammaticality judgment		Elicited imitation		Grammaticality judgment	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
Headed RC SU	1 (N=17)	73.53	20.67	83.82	17.54	92.85	15.28	92.86	11.72
	2 (N=14)	32.14	18.15	69.64	14.47				
	3 (N=16)	21.88	23.93	60.93	20.34				
	Total (N=47)	43.62	31.04	71.80	19.92	N=14			

RC type	Proficiency group	L2 learners				Native speakers			
		Elicited imitation		Grammaticality judgment		Elicited imitation		Grammaticality judgment	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
Headed RC DO	1 (N=17)	63.24	25.18	85.29	12.68	91.07	15.83	92.86	11.72
	2 (N=14)	23.21	18.25	66.07	18.62				
	3 (N=16)	15.63	15.47	46.87	27.19				
	Total (N=47)	35.11	29.33	66.48	25.68	N=14			
Headless RC SU	1 (N=17)	89.71	12.68	92.64	11.74	100	0.00	91.07	12.43
	2 (N=14)	58.93	27.04	83.92	12.43				
	3 (N=16)	60.94	34.11	75.00	15.81				
	Total (N=47)	70.74	29.17	84.04	15.13	N=14			
Headless RC DO	1 (N=17)	83.82	15.15	94.11	10.93	98.21	6.68	91.07	15.83
	2 (N=14)	50.00	37.97	75.00	13.86				
	3 (N=16)	43.75	33.54	59.37	15.47				
	Total (N=47)	60.11	34.44	76.59	19.78	N=14			

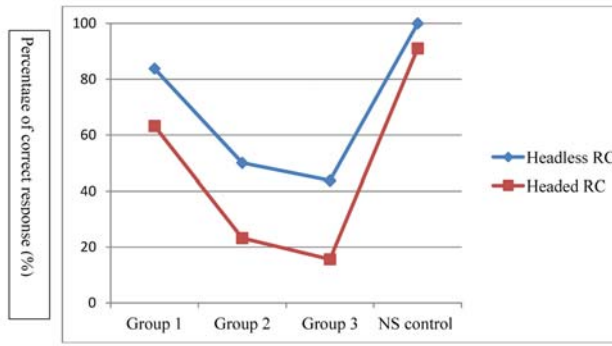
To examine the effects of RC type (headless versus headed), gap position (subject versus direct object), and proficiency levels (Groups 1, 2, and 3), a mixed analysis of variance (ANOVA) was conducted on the percentage scores of the elicited imitation and grammaticality judgment tasks, with proficiency levels as one between-group variable, and the RC type and gap position as two repeated measures variables. The assumptions of the normality of distributions for the elicited imitation and the grammaticality judgment tasks as dependent variables were met, but those for the homogeneity of variances were violated, presumably due to the unequal sizes of the groups. Despite the presence of heterogeneity of variances, it was noted that the ratio of the largest group variance to the smallest did *not* exceed 1.5, and the ANOVA was expected to be unperturbed (Keppel & Wickens, 2004). The assumptions of sphericity were also violated across the two tasks. As a result, the Greenhouse-Geisser correction was used in reporting the findings below.

The results of the elicited imitation task demonstrated no significant effect of the three-way interaction among RC type, gap position, and proficiency levels, nor was there a significant interaction effect between RC type and gap position, between RC type and proficiency level, and between gap position and proficiency level. The results of the elicited imitation task demonstrated a significant main effect for RC type, $F(1,44) = 61.84$, $p < 0.001$, partial eta squared = .58, power = 1.00, yielding massive effect sizes, as was there a significant main effect for the gap position, $F(1,44) = 11.02$, $p = 0.002$, partial eta squared = .20, power = .90, showing medium effect sizes. The proficiency levels had a significant main effect, $F(1,44) = 62.33$, $p < 0.001$, partial eta squared = .58, power = 1.00, yielding large effect sizes.

The results of the elicited imitation task further showed that the L2 learners' performance on the RC with a subject gap was significantly better than that on the RC with a direct object, $p < .05$, irrespective of their proficiency levels and the RC types. Tukey's post-hoc tests showed that while the scores of Group 1 were significantly higher than those of Group 2 and Group 3, respectively, both at $p < .001$, the difference between Group 2 and Group 3 in the elicited imitation scores was not significant, $p = .63$. Pairwise comparisons indicated that the participants scored higher on the headless RC structures than they did on the headed RCs, $p < .001$, regardless of their proficiency levels and the gap positions. As shown in Figure 1, the L2 learners across the different proficiency levels achieved higher scores on the headless RCs than they did on the headed RCs not only with the subject gap (Figure 1a), but also with the direct object gap (Figure 1b). Finally, despite the significant main effects of each of the variables, the absence of interaction effects associated with RC type and gap position suggests that the effects of one variable are approximately the same regardless of the level of the other variable.



(a) Relative clause with a subject gap

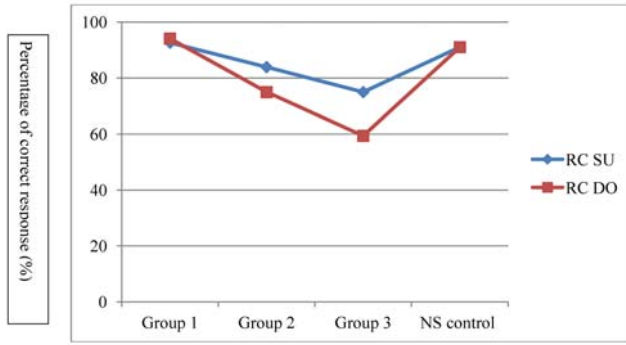


(b) Relative clause with a direct object gap

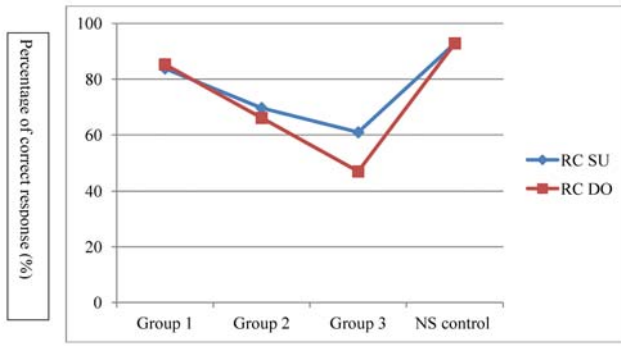
Figure 1. L2 learner performance on the elicited imitation task with respect to (a) RC SU and (b) headed RC.

The results of the grammaticality judgment task showed no interaction effects among RC type, gap position, and proficiency levels. While there were no interaction effects between RC type and gap position, and between RC type and proficiency levels, there was a significant effect for the interaction between gap position and proficiency levels, $F(1,44) = 4.85$, $p < 0.05$, partial eta squared = .18, power = .77, yielding large effect sizes. The significant effect of interaction between RC gap position and proficiency levels suggests that the effects of the gap position differ significantly across the different levels of proficiency. This significant interaction effect can be attributed to the situation in which the mean score for the RC with a subject gap (88.23%) was slightly lower than that for the RC with

a direct object gap (89.70%) in Group 1, although the participants in Groups 2 and 3 showed the subject gap advantage, as can be shown in Figure 2.



(a) Headless relative clause



(b) Headed relative clause

Figure 2. L2 learner performance on the grammaticality judgment task with respect to (a) headless RC and (b) headed RC.

When it came to the main effects of each of the three variables, i.e., RC type, gap position, and proficiency level, the results of the grammaticality judgment task showed a pattern isomorphic to those of the elicited imitation task. There was a significant main effect for RC type, $F(1,44) = 32.30$, $p < 0.001$, partial eta squared = .42, power = 1.00, as well as for the RC gap position, $F(1,44) = 8.83$, $p < 0.05$, partial eta squared = .16, power = .82. The proficiency level variable showed a significant

main effect, $F(1,44) = 41.42$, $p < 0.001$, partial eta squared = .65, power = 1.00, yielding large effect sizes. Tukey's post-hoc tests demonstrated that the mean score of Group 1 was significantly higher than those of Groups 2 and 3 at $p < .001$, and that the mean score of Group 2 was significantly higher than that of Group 3 at $p < .001$.

4. Discussion

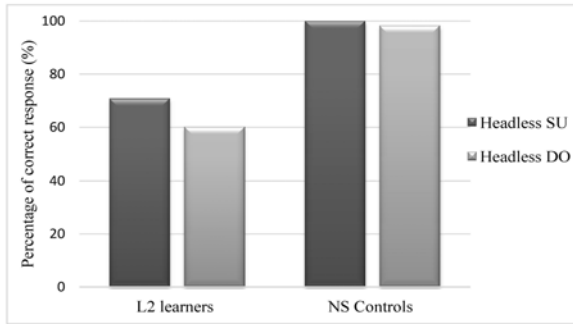
The findings reported above will be discussed in accordance with the research questions. The first question asked the developmental order between the English headed relatives and the headless relatives in the context of Korean speakers' acquisition of L2 English. As reported earlier, the results of the elicited imitation task and the grammaticality judgment task indicated that English headless relatives are significantly easier for Korean-speaking L2 learners to imitate and judge than are lexically headed relatives, irrespective of the proficiency levels and the task types. The current finding suggests that the L2 learners in this study tended to differentiate the lexically headed RCs and the headless RCs, demonstrating the developmental primacy of the headless RCs, which is consistent with previous findings regarding English L1 acquisition (Flynn & Lust, 1980), Korean L1 acquisition (Kim, 1987; Lee, 1991), and Korean L2 acquisition (Jeon & Kim, 2007).

Of note is that the L2 learners from Groups 2 and 3 showed a more significant distinction between the two types of RCs than did those from Group 1. That is, the L2 learners with lower L2 proficiency levels tended to show a stronger preference for headless RCs over headed RCs than those with higher L2 proficiency levels. The developmental primacy of headless RCs over lexically headed RCs in L2 acquisition by Korean speakers can be explained by the structural account that headless RCs allow a simple nomination of a relativized clause (Bresnan & Grimshaw, 1978; Ott, 2011; Riemsdijk, 2006). Recall that in (2a), the reference of the relative pronoun *what* has the distribution of a nominal, and that the *wh*-phrase has to match selection requirements of both matrix and

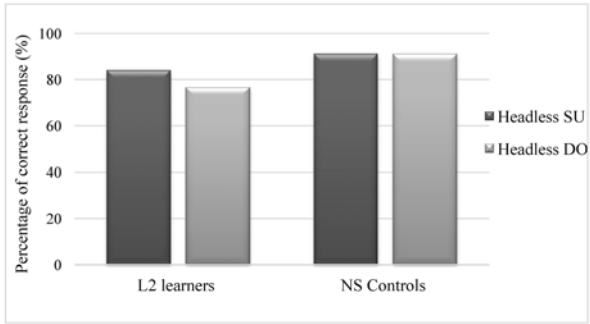
embedded predicates (Caponigro & Pearl, 2009; Ott, 2011; Riemsdijk, 2006). In other words, the L2 learners' preference for headless RCs over headed RCs is presumably based on the structural differences between lexically headed RCs and headless RCs. As the learners develop their L2 grammar, approximating native speakers' grammar, their preference for headless RCs over headed RCs fades away.

(2) a. Headless relative
I eat what you cook (Ott, 2011)

The second research question asked whether Korean-speaking L2 learners would acquire English headless relativization in the order predicted by Keenan and Comrie's (1977) NPAH hypothesis and its application in language acquisition (Comrie, 2007). To address this question, this study looked into the performance of Korean-speaking learners of L2 English with different proficiency levels on the elicited imitation task and the grammaticality judgment task on these target structures. Recall that there was a statistically significant main effect for the RC gap position (subject versus direct object) on the learners' performance on both the elicited imitation task and the grammaticality judgment task. The L2 learners' performance on the RCs, lexically headed and headless, with subject gaps was significantly better (or closer to the native-speaking controls' performance) than their performance on the RCs with direct object gaps across the different levels of proficiency, as shown in Figure 3.



(a) Elicited imitation task



(b) Grammaticality judgment task

Figure 3. Mean scores of headless RC with different gap positions on (a) the elicited imitation task and (b) the grammaticality judgment task.

This finding is consistent with the previous studies on the relative difficulty with English RCs with object gaps over those with subject gaps in the acquisition of English relativization (Friedmann & Novogrodsky, 2004; Diessel & Tomasello, 2005 in L1 acquisition; Doughy, 1991; Eckman, Bell, & Nelson, 1988; Gass, 1979 in L2 acquisition). Twenty-three learners (49% of the total sample) demonstrated a subject advantage in headless RCs on the elicited imitation task. Fifteen learners (31%) showed no asymmetry, scoring the same for the headless RCs with subject gaps and those with direct object gaps, and nine of them (19%) demonstrated a backward asymmetry, i.e., higher scores for headless RCs with direct object gaps. What is noteworthy is that the subject advantage found in this study was more pronounced in the performance of L2 learners in lower proficiency level groups, such as Groups 2 and 3, than it was in those with a higher level of proficiency, such as Group 1. Sixteen learners (53% of the total of thirty learners in Groups 2 and 3) showed the subject advantage in their performance on the elicited imitation task.

The subject advantage as a function of L2 proficiency level in this study is comparable to the previous study by Flynn and Lust (1980) on the L1 acquisition of English relativization, including lexically headed and headless RCs. Flynn and Lust found in a study using an imitation task with children whose ages ranged from 3 years and 6 months to 7 years and 7 months that young children, up until 6 and a half years, demon-

strated their strong preference for headless relatives over lexically headed relatives, but that the subject advantage gradually phased out among children in the range of 6.5 years to 7 years and 7 months. This finding suggests that the development begins with English relatives with subject gaps, whether lexically headed or headless, which are simpler in structure, and then moves on to relatives with direct object gaps, which are structurally more complex, as learners gradually acquire more complex structures.

5. Conclusions

This study set out to investigate the developmental order that Korean-speaking learners of L2 English show for English lexically headed and headless relatives. The study further examined whether the L2 learners acquire headless relativization in the order predicted by Keenan and Comrie's (1977) NPAH hypothesis and its application in language acquisition (Comrie, 2007). Korean-speaking L2 English learners' performance on the elicited imitation task and the grammaticality judgment task showed fewer occurrences of non-target-like forms in headless relatives than in lexically headed relatives, regardless of the gap position (subject versus direct object) and the task type (the elicited imitation task and the grammaticality judgment task). This finding suggests the developmental order of headless RCs followed by lexically headed RCs, which is consistent with previous studies (Flynn & Lust, 1980; Jeon & Kim, 2007; Kim, 1987). It was further observed that the L2 learners demonstrated a subject advantage in the domain of English headless RCs, which supports the validity of Keenan and Comrie's (1977) NPAH hypothesis in the context of Korean-speaking L2 learners' acquisition of English headless relativization.

The findings from this study will extend the knowledge base on L2 learning in at least two regards: theory and pedagogy. In terms of L2 theory, the study is one of the first empirical efforts to examine the representation of L2 knowledge with respect to the target structures, English lexically headed relatives and headless relatives as a function of L2 profi-

ciency levels. While issues concerning the developmental patterns of lexically headed RCs have been widely addressed in the literature, this study is the first to bring the target structures together and to test their relational status to each other in L2 development, as well as to apply the well-established findings on the developmental patterns of English relatives to the less-studied headless relatives.

Turning to L2 pedagogical issues, the current findings will make contributions to second/foreign language pedagogy with regard to different proficiencies, age levels, and contexts. Findings about the developmental patterns in the particular grammatical structures, English headed relatives and headless relatives, will possibly inform textbook writers and classroom teachers who work directly with L2 learners. (Usually headed) relative clauses are often considered to be complex, difficult structures for L2 learners to master, and they do not emerge until later in their L2 development (Ellis, 2006). However, little information is available with regard to when and/or how to infuse these grammatical structures in the instructional context, taking into account the L2 learners' readiness to acquire the structures. The findings of this study will shed light on when and/or how to teach these grammatical structures and, by extension, other difficult structures for learners with other first-language backgrounds.

In spite of its significant merits, this study may have some potential limits which lead to suggestions for future research. The test batteries employed in this proposed study are narrowly targeted at the structural representations of the target structures, i.e., lexically headed relatives and headless relatives, at different developmental stages. They can tell us little about the L2 learners' processing or semantic interpretations of the target constructions. Hence, there is a need for future research to expand this line of research and its design, as well as to investigate the processing and/or semantic interpretations of the target structures as a function of L2 proficiency levels in order to obtain a fuller picture of L2 development with respect to English relativization.

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Appendix: Elicited imitation task items

A. Grammatical items for headed relatives

1. Bullies target kids who tend to keep quiet.
2. The university fired a professor who students respected.
3. The engineer wrote a program that improved our productivity.
4. Facebook influences the relationships that people develop.

B. Ungrammatical items for headed relatives

5. *A CEO manages employees who they produce goods.
6. *Brad Pitt married Angelina Jolie who do the tabloids adore.
7. *The scientist developed a treatment that it controls fungus.
8. *The internet increased communications that people exchange them.

C. Grammatical items for headless relatives

9. President Obama knew who killed Osama bin Laden.
10. High school students quickly find out who their friends like.
11. Journalists reported what caused the uproar in Egypt.
12. Counselors observe what autistic kids can do.

D. Ungrammatical items for headless relatives

13. *Hilary Clinton knew who he killed Saddam Hussein.
14. *Kindergartners usually find out who does their teacher like.
15. *Historians documented what it caused the Korean War.
16. *Doctors examine what can patients do.